

REMARKS

Claims 1 and 3 - 5 are pending in this application. Reconsideration in view of the following remarks is respectfully requested. Applicant respectfully submits that this response is fully responsive to the Office Action dated **August 25, 2003**.

Allowable Claim Subject Matter:

Applicant gratefully acknowledges the indication in item 5 of the Office Action that claim 5 would be allowable, if amended, to include all of the limitations of the base claim and any intervening claims. However, for at least the reasons stated below, it is respectfully submitted that all of claims 1 and 3 – 5 are allowable.

As to the Merits:

As to the merits of this case, the Examiner sets forth the following rejections:

1) claim 1 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Hardesty et al. (U.S. Patent No. 6,138,056) in view of Ito et al. (U.S. Patent No. 6,456,896); and

2) claims 3 and 4 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hardesty et al. (U.S. Patent No. 6,138,056) in view of Ito et al. and Love et al. (U.S. Patent No. 5,628,871).

Both of these rejections are respectfully traversed.

The object of the present invention is to provide the machine tool maintenance system which can evaluate and control the static and/or dynamic characteristics of the machine tool by using various sensors, and preventive measures can be taken from the results of the evaluation.

In order to achieve the object, the machine tool maintenance system of claim 1 comprises at least one of the temperature sensor, displacement sensor, acceleration sensor, and the noise meter; and the judgment section for evaluating at least one of the temperature increase characteristic of the machine tool, the thermal displacement characteristic of the machine tool in accordance with the temperature increase, the vibration characteristic of the machine tool, and the noise characteristic of the machine.

With regard to claim 1, Hardesty discloses, in lines 26-54 of column 6, measuring displacement $x(d)$ and comparing it to a predetermined displacement threshold value d_i .

However, the Examiner acknowledges that:

Hardesty et al. does not teach a judgment section for evaluating at least one of a temperature increase characteristic of the machine tool, a thermal displacement characteristic of the machine tool in accordance with the temperature increase, a vibration characteristic of the machine tool, and a noise characteristic of the machine tool on the basis of a detection signal detected by the sensor and the reference values stored in the reference value storage section for judgment on the acceptability.1

1 Please see, lines 19 – 24, page 2 of the Action.

In order to compensate for the above-noted drawbacks and deficiencies of Hardesty, the Examiner relies on the secondary reference of Ito. More specifically, the Examiner asserts that the “Ito et al. teaches using a stored approximation formula along with measured data to judge and correct thermal displacement”²

However, the object of the invention of Ito et al. is to provide a thermal displacement correction method capable of easily correcting thermal displacement at low cost without requiring use of sensors.

Therefore, the apparatus of Ito et al. does not have the judgment section for evaluating the thermal displacement characteristic of the machine tool in accordance with the temperature increase.

According to the present invention, future conditions of the machine tool can be automatically estimated, so that the user side can take preventive measures such as keeping stock of replacement parts and repairs before failures.

That is, while the apparatus of Ito et al. can correct the current thermal displacement, Ito et al. cannot estimate future conditions of the machine tool and can not take preventive measures.

² Please see, lines 1 – 2, page 3 of the Action.

In addition, the Examiner is mis-characterizing the teachings of Ito, since Ito disclose that “the correction amounts (of displacement) are obtained according to approximation formulas without detecting position displacement by means of sensors,” and that “the thermal displacement measurement by means of the sensors is made only when the correction amounts predicted by the approximation formula are substantial.”

In other words, Ito discloses using the approximation formulas without the sensors, and the sensors without the approximation formula when the correction amounts predicted by the approximation formula are large.

Thus, Ito fails to disclose the features of claim 1 concerning *a judgment section for evaluating at least on a temperature increase characteristic of the machine tool, a thermal displacement characteristic of the machine tool in accordance with the temperature increase, a vibration characteristic of the machine tool, and a noise characteristic of the machine tool on the basis of a detection signal detected by the sensor and the reference values stored in the reference value storage section for judgment on the acceptability.*

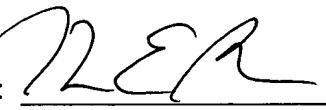
For at least the foregoing reasons, it is believed that this application is now in condition for allowance. If, for any reason, it is believed that this application is not in condition for allowance, Examiner is encouraged to contact the Applicants' undersigned attorney at the telephone number below to expedite the disposition of this case.

Application No.:09/942,581
Response dated November 24, 2003
Reply to Office Action of August 25, 2003

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully submitted,

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